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(54) Title: TREATMENT FOR FABRICS (57) Abstract A composition for treatment of a fabric, the composition comprising a naturally occurring polysaccharide gum having a β_{1-4} linkage and an enzyme capable of cleaving said polysaccharide.		

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Treatment for Fabrics

Technical Field

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The present invention relates to an oligomeric or polymeric material for deposition onto a fabric to endow a fabric care or other benefit to the fabric.

Background of the Invention

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It is known to use polysaccharide gums having a $\beta_{1,4}$ linkage (hereinafter referred to as β -1,4-polysaccharides) as ingredients in detergent compositions, e.g. guar gum when used as a thickener in bleach compositions.

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It is also known to use various different materials in laundry products for colour care, e.g. to reduce the fading of coloured dyes in the fabric due to repeated washes.

It is has now been found by the applicants that surprisingly, $\beta_{1,4}$ polysaccharides also are useful in detergent products for colour care performance, as well as anti-pilling.

20

Unfortunately, at the levels required for this purpose, the applicants have noticed a negative in terms of enhanced staining with particulate stains on the fabric.

This problem has now been overcome by combining the polysaccharides with an enzyme capable of cleaving them.

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Techniques for reducing the molecular weight of naturally occurring polysaccharides are well known in the art.

Degradation of galactomannans, polyuronic acids and galactans by a thermal process in an oxygen-free atmosphere is described in GB-A-1 042 438.

30

Galactomannans for anti-gelling of food products, by peroxide or acid hydrolysis is disclosed in GB-A-1 565 006.

- 5 GB-A-834 375 describes a method for retarding the degradation of galactomannans in hot aqueous systems by inclusion of certain water-soluble metal salts.

According to US-A-2 553 485, manno-galactans can be heat degraded to modify their adhesive properties.

10

The acid hydrolysis of partially hydrated carbohydrate gums at elevated temperatures is the subject of WO 93/15116.

- Proteolytic degradation of tamarind seed kernel polysaccharide is described in
15 US-A-3 480 511 and Ind. J. Technology, Vol. 8, September 1970, H.C. Srivastava et al, pp 347-349.

- Another non-laundry use of low molecular polysaccharide is disclosed in
GB-A-2 314 840. According to this teaching, polysaccharides having a molecular
20 weight of between 1,000 and 50,000 are useful for wound dressings or peptide/protein binding.

- As far as use of low molecular polysaccharides in surfactant-based products is concerned, EP-A-367 335 discloses use of a cationic guar gum having a molecular
25 weight of 50,000 - 100,000,000 preferably 100,000 - 500,000, especially 250,000 - 400,000 to improve the feel of toilet bars based on alkali metal soaps. According to EP-A-227 321, the mildness of soap bars is improved using a hydrated cationic polymeric polysaccharide having from 5-6 saccharide units on average. Another soap bar containing a cationic polysaccharide having a molecular weight of 1,000 -
30 3,000,000, preferably 2,500 - 350,000 is disclosed in US-A-5 064 555.

US-A-4 179 382 discloses a textile softening agent which includes a cationic salt which optionally may be a cationic polysaccharide, e.g. having a molecular weight of 220,000.

US-A-5 510 052 discloses dishware pretreatment compositions which include a
5 thickener which may be a polysaccharide gum, and an enzyme. However, there is no mention of enzymes such as cellulases or mannanases which can reduce the molecular weight of the polysaccharide, and there is no indication of use for laundering of fabrics.

A method of enhancing the ability of a polysaccharide to flow through a porous medium
10 in aqueous solution by mixing it with an enzyme to cause hydrolytic degradation of the saccharide linkages is disclosed in US-A-4 326 037.

Definition of the Invention

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Thus, according to the present invention, there is provided a composition for treatment of a fabric, the composition comprising a naturally occurring polysaccharide gum having a β 1-4 linkage and an enzyme capable of cleaving said polysaccharide.

20 Detailed Description of the Invention

Compositions

The amount of the polysaccharide gum is preferably from 0.05% to 10%, more
25 preferably from 0.1% to 5% by weight of the total composition. Also based on the weight of the total composition, the amount of the enzyme is preferably from 0.01% to 3%, more preferably from 0.05% to 1% by weight of the commercially supplied material. Such commercial materials normally contain from 1-10% by weight of the material of active enzyme.

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The polysaccharide is preferably selected from galactomannan (e.g. derived from locust bean gum or guar gum), glucomannan (e.g. Konjac glucomannan), xanthan gum and xyloglucan (e.g. tamarind xyloglucan), and mixtures thereof.

- 5 Some preferred enzymes found to have this property are the cellulases, such as those sold under the Trade Marks Celluzyme, Endolase, Carezyme, Clarinase and Puradax, as well as mannanases.

- 10 The enzyme comprises one or more enzyme types selected from those capable of cleaving the polysaccharide. Whether or not the enzyme has this capability may be determined by as simple assay, according to the following protocol for measuring the viscosity drop of the polysaccharide in solution:-

- 15 (i) Prepare a 1.5% solution of polysaccharide at desired pH. Roll on the bottle roller overnight.
- (ii) Weigh out 50g of the solution into clean 120 ml glass jars. Place in the shaker bath at 40 °C to equilibrate.
- 20 (iii) Prepare stock solution of the enzyme and add a total of 1ml (which contains enough enzyme to make the total concentrations between 1 and 20 mg/l) to the 50g polysaccharide solution. Shake the bottle to mix the solutions. Agitate at 150rpm for 30 mins at 40 °C. Stop the reaction by adding enough 50% sodium hydroxide to bring the pH up to 12 - 12.5.
- 25 (iv) Keep the solutions at 40 °C and measure the viscosity on the Haake VT500 viscometer. The enzyme activity is indicated by a significant viscosity drop of the polymer solution by enzyme treatment.

- 30 The active ingredient in the compositions is preferably a surface active agent or a fabric conditioning agent. More than one active ingredient may be included. For some applications a mixture of active ingredients may be used.

The compositions of the invention may be in any physical form e.g. a solid such as a powder or granules, a tablet, a solid bar, a paste, gel or liquid, especially, an aqueous based liquid.

5

The compositions of the present invention are preferably laundry compositions, especially main wash (fabric washing) compositions or rinse-added softening compositions. The main wash compositions may include a fabric softening agent and rinse-added fabric softening compositions may include surface-active compounds, particularly non-ionic surface-active compounds, if appropriate.

10

The detergent compositions of the invention may contain a surface-active compound (surfactant) which may be chosen from soap and non-soap anionic, cationic, non-ionic, amphoteric and zwitterionic surface-active compounds and mixtures thereof. Many suitable surface-active compounds are available and are fully described in the literature, for example, in "Surface-Active Agents and Detergents", Volumes I and II, by Schwartz, Perry and Berch.

15

The preferred detergent-active compounds that can be used are soaps and synthetic non-soap anionic and non-ionic compounds.

20

The compositions of the invention may contain linear alkylbenzene sulphonate, particularly linear alkylbenzene sulphonates having an alkyl chain length of C₈-C₁₅. It is preferred if the level of linear alkylbenzene sulphonate is from 0 wt% to 30 wt%, more preferably 1 wt% to 25 wt%, most preferably from 2 wt% to 15 wt%.

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The compositions of the invention may contain other anionic surfactants in amounts additional to the percentages quoted above. Suitable anionic surfactants are well-known to those skilled in the art. Examples include primary and secondary alkyl sulphates,

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particularly C₈-C₁₅ primary alkyl sulphates; alkyl ether sulphates; olefin sulphonates; alkyl xylene sulphonates; dialkyl sulphosuccinates; and fatty acid ester sulphonates. Sodium salts are generally preferred.

- 5 The compositions of the invention may also contain non-ionic surfactant. Nonionic surfactants that may be used include the primary and secondary alcohol ethoxylates, especially the C₈-C₂₀ aliphatic alcohols ethoxylated with an average of from 1 to 20 moles of ethylene oxide per mole of alcohol, and more especially the C₁₀-C₁₅ primary and secondary aliphatic alcohols ethoxylated with an average of from 1 to 10 moles of
10 ethylene oxide per mole of alcohol. Non-ethoxylated nonionic surfactants include alkylpolyglycosides, glycerol monoethers, and polyhydroxyamides (glucamide).

It is preferred if the level of non-ionic surfactant is from 0 wt% to 30 wt%, preferably from 1 wt% to 25 wt%, most preferably from 2 wt% to 15 wt%.

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- It is also possible to include certain mono-alkyl cationic surfactants which can be used in main-wash compositions for fabrics. Cationic surfactants that may be used include quaternary ammonium salts of the general formula R₁R₂R₃R₄N⁺ X⁻ wherein the R groups are long or short hydrocarbon chains, typically alkyl, hydroxyalkyl or
20 ethoxylated alkyl groups, and X is a counter-ion (for example, compounds in which R₁ is a C₈-C₂₂ alkyl group, preferably a C₈-C₁₀ or C₁₂-C₁₄ alkyl group, R₂ is a methyl group, and R₃ and R₄, which may be the same or different, are methyl or hydroxyethyl groups); and cationic esters (for example, choline esters).

- 25 The choice of surface-active compound (surfactant), and the amount present, will depend on the intended use of the detergent composition. In fabric washing compositions, different surfactant systems may be chosen, as is well known to the skilled formulator, for handwashing products and for products intended for use in different types of washing machine.

30

The total amount of surfactant present will also depend on the intended end use and may be as high as 60 wt%, for example, in a composition for washing fabrics by hand. In

compositions for machine washing of fabrics, an amount of from 5 to 40 wt% is generally appropriate. Typically the compositions will comprise at least 2 wt% surfactant e.g. 2-60%, preferably 15-40% most preferably 25-35%.

- 5 Detergent compositions suitable for use in most automatic fabric washing machines generally contain anionic non-soap surfactant, or non-ionic surfactant, or combinations of the two in any suitable ratio, optionally together with soap.

- The compositions of the invention, when used as main wash fabric washing
10 compositions, will generally also contain one or more detergency builders. The total amount of detergency builder in the compositions will typically range from 5 to 80 wt%, preferably from 10 to 60 wt%.

- Inorganic builders that may be present include sodium carbonate, if desired in
15 combination with a crystallisation seed for calcium carbonate, as disclosed in GB 1 437 950 (Unilever); crystalline and amorphous aluminosilicates, for example, zeolites as disclosed in GB 1 473 201 (Henkel), amorphous aluminosilicates as disclosed in GB 1 473 202 (Henkel) and mixed crystalline/amorphous aluminosilicates as disclosed in GB 1 470 250 (Procter & Gamble); and layered silicates as disclosed in EP 164 514B
20 (Hoechst). Inorganic phosphate builders, for example, sodium orthophosphate, pyrophosphate and tripolyphosphate are also suitable for use with this invention.

- The compositions of the invention preferably contain an alkali metal, preferably sodium, aluminosilicate builder. Sodium aluminosilicates may generally be incorporated in
25 amounts of from 10 to 70% by weight (anhydrous basis), preferably from 25 to 50 wt%.

The alkali metal aluminosilicate may be either crystalline or amorphous or mixtures thereof, having the general formula: $0.8-1.5 \text{ Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 0.8-6 \text{ SiO}_2$

- 30 These materials contain some bound water and are required to have a calcium ion exchange capacity of at least 50 mg CaO/g. The preferred sodium aluminosilicates contain 1.5-3.5 SiO_2 units (in the formula above). Both the amorphous and the crystalline

materials can be prepared readily by reaction between sodium silicate and sodium aluminate, as amply described in the literature. Suitable crystalline sodium aluminosilicate ion-exchange detergency builders are described, for example, in GB 1 429 143 (Procter & Gamble). The preferred sodium aluminosilicates of this type are the well-known commercially available zeolites A and X, and mixtures thereof.

The zeolite may be the commercially available zeolite 4A now widely used in laundry detergent powders. However, according to a preferred embodiment of the invention, the zeolite builder incorporated in the compositions of the invention is maximum aluminium zeolite P (zeolite MAP) as described and claimed in EP 384 070A (Unilever). Zeolite MAP

is defined as an alkali metal aluminosilicate of the zeolite P type having a silicon to aluminium ratio not exceeding 1.33, preferably within the range of from 0.90 to 1.33, and more preferably within the range of from 0.90 to 1.20.

Especially preferred is zeolite MAP having a silicon to aluminium ratio not exceeding 1.07, more preferably about 1.00. The calcium binding capacity of zeolite MAP is generally at least 150 mg CaO per g of anhydrous material.

Organic builders that may be present include polycarboxylate polymers such as polyacrylates, acrylic/maleic copolymers, and acrylic phosphinates; monomeric polycarboxylates such as citrates, gluconates, oxydisuccinates, glycerol mono-, di and trisuccinates, carboxymethyloxy succinates, carboxymethyloxymalonates, dipicolinates, hydroxyethyliminodiacetates, alkyl- and alkenylmalonates and succinates; and sulphonated fatty acid salts. This list is not intended to be exhaustive.

Especially preferred organic builders are citrates, suitably used in amounts of from 5 to 30 wt%, preferably from 10 to 25 wt%; and acrylic polymers, more especially acrylic/maleic copolymers, suitably used in amounts of from 0.5 to 15 wt%, preferably from 1 to 10 wt%.

Builders, both inorganic and organic, are preferably present in alkali metal salt, especially sodium salt, form.

Compositions according to the invention may also suitably contain a bleach system.

- 5 Fabric washing compositions may desirably contain peroxy bleach compounds, for example, inorganic persalts or organic peroxyacids, capable of yielding hydrogen peroxide in aqueous solution.

- 10 Suitable peroxy bleach compounds include organic peroxides such as urea peroxide, and inorganic persalts such as the alkali metal perborates, percarbonates, perphosphates, persilicates and persulphates. Preferred inorganic persalts are sodium perborate monohydrate and tetrahydrate, and sodium percarbonate.

- 15 Especially preferred is sodium percarbonate having a protective coating against destabilisation by moisture. Sodium percarbonate having a protective coating comprising sodium metaborate and sodium silicate is disclosed in GB 2 123 044B (Kao).

- 20 The peroxy bleach compound is suitably present in an amount of from 0.1 to 35 wt%, preferably from 0.5 to 25 wt%. The peroxy bleach compound may be used in conjunction with a bleach activator (bleach precursor) to improve bleaching action at low wash temperatures. The bleach precursor is suitably present in an amount of from 0.1 to 8 wt%, preferably from 0.5 to 5 wt%.

- 25 Preferred bleach precursors are peroxycarboxylic acid precursors, more especially peracetic acid precursors and peroxoanoic acid precursors. Especially preferred bleach precursors suitable for use in the present invention are N,N,N',N',-tetracetyl ethylenediamine (TAED) and sodium nonanoyloxybenzene sulphonate (SNOBS). The novel quaternary ammonium and phosphonium bleach precursors disclosed in US 4 751 015 and US 4 818 426 (Lever Brothers Company) and EP 402 971A (Unilever), and the
30 cationic bleach precursors disclosed in EP 284 292A and EP 303 520A (Kao) are also of interest.

The bleach system can be either supplemented with or replaced by a peroxyacid. examples of such peracids can be found in US 4 686 063 and US 5 397 501 (Unilever). A preferred example is the imido peroxy-carboxylic class of peracids described in EP A 325 288, EP A 349 940, DE 382 3172 and EP 325 289. A particularly preferred example is

5 phtalimido peroxy caproic acid (PAP). Such peracids are suitably present at 0.1 - 12%, preferably 0.5 - 10%.

A bleach stabiliser (transition metal sequestrant) may also be present. Suitable bleach stabilisers include ethylenediamine tetra-acetate (EDTA), the polyphosphonates such as

10 Dequest (Trade Mark) and non-phosphate stabilisers such as EDDS (ethylene diamine di-succinic acid). These bleach stabilisers are also useful for stain removal especially in products containing low levels of bleaching species or no bleaching species.

An especially preferred bleach system comprises a peroxy bleach compound (preferably

15 sodium percarbonate optionally together with a bleach activator), and a transition metal bleach catalyst as described and claimed in EP 458 397A ,EP 458 398A and EP 509 787A (Unilever).

The compositions according to the invention may also contain one or more enzyme(s).

20 Suitable enzymes include the proteases, amylases, cellulases, oxidases, peroxidases and lipases usable for incorporation in detergent compositions. Preferred proteolytic enzymes (proteases) are, catalytically active protein materials which degrade or alter protein types of stains when present as in fabric stains in a hydrolysis reaction. They may be of any suitable origin, such as vegetable, animal, bacterial or yeast origin.

25 Proteolytic enzymes or proteases of various qualities and origins and having activity in various pH ranges of from 4-12 are available and can be used in the instant invention. Examples of suitable proteolytic enzymes are the subtilins which are obtained from particular strains of B. Subtilis B. licheniformis, such as the commercially available

30 subtilisins Maxatase (Trade Mark), as supplied by Gist Brocades N.V., Delft, Holland, and Alcalase (Trade Mark), as supplied by Novo Industri A/S, Copenhagen, Denmark.

Particularly suitable is a protease obtained from a strain of *Bacillus* having maximum activity throughout the pH range of 8-12, being commercially available, e.g. from Novo Industri A/S under the registered trade-names Esperase (Trade Mark) and Savinase (Trade-Mark). The preparation of these and analogous enzymes is described in GB 1 243 785. Other commercial proteases are Kazusase (Trade Mark obtainable from Showa-Denko of Japan), Optimase (Trade Mark from Miles Kali-Chemie, Hannover, West Germany), and Superase (Trade Mark obtainable from Pfizer of U.S.A.).

10 Detergency enzymes are commonly employed in granular form in amounts of from about 0.1 to about 3.0 wt%. However, any suitable physical form of enzyme may be used.

The compositions of the invention may contain alkali metal, preferably sodium carbonate, in order to increase detergency and ease processing. Sodium carbonate may suitably be present in amounts ranging from 1 to 60 wt%, preferably from 2 to 40 wt%. However, compositions containing little or no sodium carbonate are also within the scope of the invention.

20 Powder flow may be improved by the incorporation of a small amount of a powder structurant, for example, a fatty acid (or fatty acid soap), a sugar, an acrylate or acrylate/maleate copolymer, or sodium silicate. One preferred powder structurant is fatty acid soap, suitably present in an amount of from 1 to 5 wt%.

25 Other materials that may be present in detergent compositions of the invention include sodium silicate; antiredeposition agents such as cellulosic polymers; soil release polymers; inorganic salts such as sodium sulphate; lather control agents or lather boosters as appropriate; proteolytic and lipolytic enzymes; dyes; coloured speckles; perfumes; foam controllers; fluorescers and decoupling polymers. This list is not intended to be exhaustive. However, many of these ingredients will be better delivered as benefit agent groups in materials according to the first aspect of the invention.

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The detergent composition when diluted in the wash liquor (during a typical wash cycle) will typically give a pH of the wash liquor from 7 to 10.5 for a main wash detergent.

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Particulate detergent compositions are suitably prepared by spray-drying a slurry of compatible heat-insensitive ingredients, and then spraying on or post-dosing those ingredients unsuitable for processing via the slurry. The skilled detergent formulator will have no difficulty in deciding which ingredients should be included in the slurry and which should not.

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Particulate detergent compositions of the invention preferably have a bulk density of at least 400 g/l, more preferably at least 500 g/l. Especially preferred compositions have bulk densities of at least 650 g/litre, more preferably at least 700 g/litre.

15

Such powders may be prepared either by post-tower densification of spray-dried powder, or by wholly non-tower methods such as dry mixing and granulation; in both cases a high-speed mixer/granulator may advantageously be used. Processes using high-speed mixer/granulators are disclosed, for example, in EP 340 013A, EP 367 339A, EP 390 251A and EP 420 317A (Unilever).

20

Liquid detergent compositions can be prepared by admixing the essential and optional ingredients thereof in any desired order to provide compositions containing components in the requisite concentrations. Liquid compositions according to the present invention can also be in compact form which means it will contain a lower level of water compared to a conventional liquid detergent.

25

Any suitable method may be used to produce the compounds of the present invention. In particular polymerisation of the sunscreen and/or SOQ and polymer as described in the examples may be used.

30

Treatment

The treatment of the fabric with the material of the invention can be made by any suitable method such as washing, soaking or rinsing of the fabric.

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Examples 1 and 2: Detergent Formulations

Component	Example 1 % w/w	Example2 % w/w
Na-LAS	8.68	10.37
Nonionic 7EO, branched	4.55	5.45
Nonionic 3EO, branched	2.44	2.92
soap	1.12	1.34
zeolite A24 (anhydrous)	29.63	35.43
Na-citrate 2aq	3.49	4.17
light soda ash	5.82	6.96
SCMC (68%)	0.54	0.65
Antifoam granule	1.70	2.20
Fluorescer adjunct (15 %)	1.30	-
PVP (95 %)	0.10	0.60
SRP (18 %)	1.50	1.50
Sokalan CP5 (93%)	1.00	1.00
Na-citrate 2aq	-	3.60
Na-carbonate	-	11.35
Na-Bi-carbonate	1.00	4.00
(carbonate/29 % sil co-granule)	5.5	-
TAED white (as gran.83%)	5.5	-
Coated Percarbonate (13.5 avOx)	19.00	-
Dequest 2047	1.00	1.40
Savinase 12.0T 3250 GU/mg	0.78	0.78
Lipolase 100T 187 LU/mg	0.12	0.12
Minors, moisture, salts	balance	balance
TOTAL	100.00	100.00

To each of Examples 1 and 2 were added, 3% of locust bean gum (native), together with
10 0.2% Carezyme 1.0T enzyme, on top of the 100%.

Raw Material Specification

<u>Component</u>	<u>Specification</u>
5 Na LAS	Sodium salt, alkyl benzene sulphonate
Nonionic 7EO, branched	C12-C15 branched alcohol ethoxylated with an average of 7 ethyleneoxy groups
Nonionic 3EO, branched	C12-C15 branched alcohol ethoxylated with an average of 3 ethyleneoxy groups
10 SCMC	Sodium carboxymethyl cellulose
PVP	Polyvinyl pyrrolidone
Sokalan CP5	Polymer builder
Dequest 2047	Metal Sequestrant, ex Monanto
Savinase 12.0T	Proteolytic enzyme, ex Novo
15 Lipolase 100T	Lipolytic enzyme
Carezyme 1.0T	Cellulase enzyme

Example 3: Comparative Tests

Washed off white woven mercerised bleached non-fluorescent cotton was washed in
5 different conditions (control and test). Formulations contained 0.5 g/l surfactant (50 %
w/w Synperonic A7 (nonionic) and 50% w/w Na LAS) in 0.01M phosphate buffer
pH=7.0. Where used, LBG=locust bean gum (3%). The fabrics were subsequently
stained with clay and washed again in the same conditions now in the presence of
enzymes as specified in the table below. Before and after washing of the stain its
10 reflectance was measured. The difference (Delta R) at 460 nm is a measure for the
efficiency of stain removal. The results are given below.

Formulation	Delta R (460)
Control (No gum, no enzyme)	23.7
LBG, no enzyme	8.0
LBG + Celluzyme 200 AU/l	21.6
LBG + mannanase 5 ppm	18.6
LBG + Clazinase 5 ppm	13.5
LBG + Endolase 5 ppm	18.8

15

Example 4: Comparative Tests

Washed off white woven mercerised bleached non-fluorescent cotton was washed in
different conditions (control and test). Formulations contained 0.5 g/l surfactant (50 %
20 w/w Synperonic A7 (nonionic) and 50% w/w Na LAS) in 0.01M carbonate buffer
pH=10.8. LBG was optionally included as in Example 3. The fabrics were
subsequently stained with clay and washed again in the same conditions now in the
presence of enzymes as specified in the table below. Before and after washing of the
stain its reflectance was measured. The difference (Delta R) at 460 nm is a measure for

the efficiency of stain removal. The results are given below.

Formulation	Delta R (460)
Control (No gum, no enzyme)	17.8
LBG, no enzyme	5.1
LBG + Celluzyme 200 AU/l	15.4
LBG + mannanase 5 ppm	9.5

CLAIMS:

1. A composition for treatment of a fabric, the composition comprising a naturally
5 occurring polysaccharide gum having a β_{1-4} linkage and an enzyme capable of cleaving
said polysaccharide.
2. A composition according to claim 1, wherein the amount of the polysaccharide
gum is from 0.05 % to 10% by weight of the total composition, preferably from 0.1% to
10 5% .
3. A composition according to claim 1 or claim 2, wherein the amount of the
enzyme is from 0.01% to 3%, preferably from 0.05% to 1% by weight of the total
composition.
15
4. A composition according to any preceding claim, wherein the polysaccharide is
selected from galactomannan (e.g. derived from locust bean gum, guar gum),
glucomannan (e.g. Konjac glucomannan), xanthan gum, xyloglucan (e.g. tamarind
xyloglucan) and mixture thereof.
20
5. A composition according to any preceding claim, wherein the enzyme is selected
from cellulases, such as those sold under the Trade Marks Celluzyme, Endolase,
Carezyme, Clarinase and Purdax, and mannanases.
- 25 6. A composition according to any preceding claim, further comprising from 5% to
50% by weight of surfactant.

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/EP 99/09591

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C11D3/22 C11D3/386

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C11D D06M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	WO 90 02790 A (ECOLAB INC) 22 March 1990 (1990-03-22) page 16 -page 17; claims	1,2,4,5
X	WO 98 17770 A (NOVONORDISK AS; NOVO NORDISK BIOCHEM NORTH AME) 30 April 1998 (1998-04-30) claims; examples 4,12	1-3,5,6
X	US 4 610 800 A (DURHAM DONALD ET AL) 9 September 1986 (1986-09-09) claims	1,2,4,5
	-/-	

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"A" document member of the same patent family

Date of the actual completion of the international search

16 March 2000

Date of mailing of the international search report

24/03/2000

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INTERNATIONAL SEARCH REPORT

Intern. Application No

PCT/EP 99/09591

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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X	WO 95 35362 A (GIST BROCADES BV) 28 December 1995 (1995-12-28) page 24 -page 25	1-5
X	WO 95 27036 A (PROCTER & GAMBLE) 12 October 1995 (1995-10-12) page 9; claims	1-6
A	US 5 126 051 A (SHELL FRANCIS J ET AL) 30 June 1992 (1992-06-30) column 5 -column 7; claims	1-5

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